Space Weather Forecast

Issued on Monday 30 December 2024 at 01:06 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

---

Space Weather Forecast Headline: Minor/Moderate radio blackouts (R1/R2) expected throughout the period. Chance of R3 blackouts. A coronal mass ejection (CME) arrival is expected on 31 Dec, with G1-G2 Minor/Moderate storm likely, with a slight chance of G3 Strong storm.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been High, with a Strong flare observed emanating from the large complex region in the northwest quadrant early on 29 Dec. Further Moderate flares have been observed from regions on the northwest limb, in the southwest, southeast and from regions just beyond the southeast limb.

There are ten sunspot regions on the Earth-facing side of the Sun. The largest and most complex region lies in the northwest, with other regions of note in the southwest and northeast. The remaining spots are smaller and simpler.

Numerous coronal mass ejections (CMEs) have been observed leaving the disc over the past 24 hours. However, these mostly considered to have been far-sided. However, a filament eruption (arc of plasma) was observed in imagery within the vicinity of a sunspot region located in the southeast quadrant. This produced a partial halo CME, which has been analysed as potentially being Earth-directed, with an expected arrival at Earth on Day 2 (31 Dec).

Solar Wind / Geomagnetic Activity: Solar winds showed a mostly slow regime. The total magnetic field strength has been weak, with some brief moderate levels observed towards the end of the observation period. the north-south component of the magnetic field has also varied generally weakly. Geomagnetic activity was Quiet throughout (Kp 0-2).

Energetic Particles / Solar Radiation: High energy proton flux (greater than 10MeV) at GOES18 remained at background levels throughout, well below the 1-pfu S1/Minor Radiation Storm threshold.

Four-Day Space Weather Forecast Summary

Solar Activity: Generally Moderate solar activity is expected through the next four days, with an elevated risk of High activity, especially from the largest and most complex sunspot region in the northwest. There is an increasing risk of activity from regions due to rotate onto the visible disc from the far-side of the Sun in the coming days.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.

Solar Wind / Geomagnetic Activity: No coronal hole fast winds currently feature in the forecast. A partial halo CME observed in imagery looks to be associated with an Moderate-class flare and a filament eruption near the vicinity of a sunspot region located in the southeast quadrant of the disc at around 29/0440UTC. This event has been analysed as Earth-directed, which is expected to arrive at Earth on Day 2 (31 Dec), although further analysis is currently underway.

Geomagnetic activity is expected to be mainly Quiet, but with a Slight Chance of Unsettled to Active (Kp 3-4) intervals should any glancing CME effects occur between 30 Dec to 01 Jan. The aforementioned Earth-directed CME arriving on Day 2 (31 Dec) is expected to enhance geomagnetic activity, reaching G1-G2 Minor/Moderate storm, with a slight chance of G3/Strong storm. The effects of the CME may linger into Day 3 (01 Jan), before waning by Day 4 (02 Jan).

Energetic Particles / Solar Radiation: There is a Slight Chance of S1/Minor Radiation Storm or greater enhancements during the period. The risk slightly increases during the period as significant sunspot regions rotate into a more favourable position.

Geomagnetic Storms

Geomagnetic Storm	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Minor or Moderate	G1 to G2	No	5	60	30	5
Strong	G3	No	1	20	10	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X-Ray Flares

X-Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 (M Class)	Yes	90	90	90	90
Very Active	R3-R5 (X Class)	Yes	30	30	30	30

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.

Solar Radiation Storms (High Energy Protons)

Radiation Storms Probability (Exceedance)	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	15	15	15	15
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.